

CLAIMS

- [c1] 1. A method for electrically coupling packaged microelectronic devices, comprising:
- positioning a first packaged microelectronic device adjacent to a support member having support member circuitry, the first packaged microelectronic device having a first microelectronic die at least partially encased in a first encapsulant to define a first package configuration;
 - electrically connecting the first packaged microelectronic device to a first portion of the support member circuitry;
 - positioning at least proximate to the first packaged microelectronic device a second packaged microelectronic device having a second microelectronic die at least partially encased in a second encapsulant to define a second package configuration different than the first package configuration, with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device; and
 - electrically coupling the second packaged microelectronic device to a second portion of the support member circuitry without fixedly attaching the second packaged microelectronic device directly to the first packaged microelectronic device.
- [c2] 2. The method of claim 1 wherein electrically connecting the second packaged microelectronic device to the circuitry includes routing connector leads of the second packaged microelectronic device around the first packaged microelectronic device and attaching the connector leads to terminals of the support member.

[c3] 3. The method of claim 1 wherein electrically connecting the second packaged microelectronic device to the circuitry of the support member includes attaching conductive members directly between the second packaged microelectronic device and the support member without connecting the conductive members to the first packaged microelectronic device.

[c4] 4. The method of claim 1 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the method further includes positioning the second packaged microelectronic device with the third edge extending outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge extending outwardly beyond the second edge of the first packaged microelectronic device.

[c5] 5. The method of claim 1, further comprising selecting the first packaged microelectronic device to have a first planform shape and selecting the second packaged microelectronic device to have a second planform shape that is more extensive than the first planform shape in a plane generally parallel to a plane of the support member.

[c6] 6. The method of claim 1, further comprising spacing the second packaged microelectronic device apart from the first packaged microelectronic device while the packaged devices are attached to the support member.

[c7] 7. The method of claim 1, further comprising engaging the first and second packaged microelectronic devices with each other while the first and second packaged microelectronic devices are electrically connected to the support member.

[c8] 8. The method of claim 1, further comprising removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member.

[c9] 9. The method of claim 1 wherein the second packaged microelectronic device is one of two second packaged microelectronic devices, and wherein the method further comprises removing the one second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member and replacing the one second packaged microelectronic device with the other second packaged microelectronic device.

[c10] 10. The method of claim 1, further comprising testing the first packaged microelectronic device while the first packaged microelectronic device is attached to the support member and before attaching the second packaged microelectronic device to the support member.

[c11] 11. The method of claim 1 wherein electrically connecting the second packaged microelectronic device to the circuitry of the support member includes connecting solder balls to the second packaged microelectronic device and the support member, with the solder balls extending adjacent to an outer edge of the first packaged microelectronic device.

[c12] 12. The method of claim 1 wherein the first and second portions of the support member circuitry are connected, and wherein the method further comprises electrically coupling the first packaged microelectronic device to the second packaged microelectronic device via the support member circuitry.

- [c13] 13. A method for electrically coupling microelectronic dies, comprising:
positioning one of a first microelectronic die and a second microelectronic die adjacent to a support member, the first microelectronic die being initially unpackaged when it is positioned at least proximate to the support member, the second microelectronic die being at least partially encased in an encapsulant;
electrically connecting the one microelectronic die to a first portion of circuitry of the support member;
positioning the other microelectronic die at least proximate to the support member, with the one microelectronic die positioned between the support member and other microelectronic die; and
electrically coupling the other microelectronic die to a second portion of the circuitry of the support member.
- [c14] 14. The method of claim 13 wherein the encapsulant is a first encapsulant, and wherein the method further comprises disposing a second encapsulant adjacent to the first microelectronic die after the first microelectronic die is coupled to the circuitry of the support member.
- [c15] 15. The method of claim 13 wherein the one microelectronic die is the second microelectronic die and is at least partially encased in the encapsulant and the other microelectronic die is the unpackaged first microelectronic die, and further wherein electrically coupling the first microelectronic die to the circuitry of the support member includes routing connector pins of the first microelectronic die around the encapsulant of the second microelectronic die and attaching the connector pins to terminals of the support member.
- [c16] 16. The method of claim 13, further comprising spacing the first microelectronic die apart from the encapsulant of the second microelectronic die.

- [c17] 17. The method of claim 13 wherein electrically connecting the one microelectronic die to the circuitry of the support member and electrically coupling the other microelectronic die to the circuitry of the support member includes electrically coupling the one microelectronic die to the other microelectronic die via the circuitry of the support member.
- [c18] 18. The method of claim 13, further comprising removing the other microelectronic die from the support member without removing the one microelectronic die from the support member.
- [c19] 19. The method of claim 13 wherein electrically coupling the other microelectronic die to the circuitry of the support member includes attaching conductive members directly between the other microelectronic die and the support member without connecting the conductive members to the one microelectronic die.
- [c20] 20. A method for supporting packaged microelectronic devices, comprising:
- coupling a first packaged microelectronic device to a support member by bonding solder balls of the first packaged device to corresponding bond pads of the support member;
 - positioning a second packaged microelectronic device at least proximate to the support member with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device; and
 - coupling the second packaged microelectronic device to the support member by positioning connector members of the second packaged device outwardly from an outer edge of the first packaged device and connecting the connector members directly to the support member.

[c21] 21. The method of claim 20 wherein the solder balls of the first packaged device are first solder balls, and further wherein coupling the second packaged microelectronic device includes connecting second solder balls to the second packaged microelectronic device and the support member, with the second solder balls positioned outwardly from an outer edge of the first packaged microelectronic device.

[c22] 22. The method of claim 20 wherein coupling the second packaged microelectronic device to the support member includes routing connector pins of the second packaged microelectronic device around a portion of the first packaged microelectronic device and attaching the connector pins to the support member.

[c23] 23. The method of claim 20 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge, and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the method further includes positioning the second packaged microelectronic device with the third edge of the second packaged microelectronic device extending outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extending outwardly beyond the second edge of the first packaged microelectronic device.

[c24] 24. The method of claim 20, further comprising selecting the first packaged microelectronic device to have a first planform shape and selecting the second packaged microelectronic device to have a second planform shape that is more extensive than the first planform shape in a plane generally parallel to a plane of the support member.

[c25] 25. The method of claim 20, further comprising spacing the second packaged microelectronic device apart from the first packaged microelectronic device while the packaged devices are attached to the support member.

[c26] 26. The method of claim 20, further comprising removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member.

[c27] 27. The method of claim 20, further comprising testing the first packaged microelectronic device while the first packaged microelectronic device is attached to the support member and before attaching the second packaged microelectronic device to the support member.

[c28] 28. The method of claim 20 wherein coupling the second packaged microelectronic device to the support member includes attaching conductive members directly between the second packaged microelectronic device and the support member without connecting the conductive members to the first packaged microelectronic device.

[c29] 29. A method for supporting packaged microelectronic devices, comprising:

positioning a first packaged microelectronic device proximate to a support member and electrically coupling the first packaged microelectronic device to the support member, the first packaged microelectronic device having a first planform shape in a plane generally parallel to a plane of the support member;

positioning a second packaged microelectronic device at least proximate to the first packaged microelectronic device with the first packaged microelectronic device located between the support member and the second packaged microelectronic device, the second packaged

microelectronic device having a second planform shape in a plane generally parallel to the plane of the support member, the second planform shape being different than the first planform shape; and electrically coupling the first and second packaged microelectronic devices to the support member.

[c30] 30. The method of claim 29 wherein the first planform shape defines a first planform area and the second planform shape defines a second planform area, and wherein the method further comprises selecting the second planform area to be larger than the first planform area.

[c31] 31. The method of claim 29 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge, and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the method further includes positioning the second packaged microelectronic device with the third edge extending outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge extending outwardly beyond the second edge of the first packaged microelectronic device.

[c32] 32. The method of claim 29, further comprising spacing the second packaged microelectronic device apart from the first packaged microelectronic device while the packaged devices are attached to the support member.

[c33] 33. The method of claim 29, further comprising removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member.

[c34] 34. The method of claim 29 wherein electrically coupling the second packaged microelectronic device to the support member includes attaching

conductive members directly between the second packaged microelectronic device and the support member without connecting the conductive members to the first packaged microelectronic device.

[c35] 35. A method for supporting packaged microelectronic devices, comprising:

positioning a first packaged microelectronic device proximate to a support member and electrically connecting the first packaged microelectronic device directly to a first portion of circuitry of the support member;

positioning a second packaged microelectronic device proximate to the first packaged microelectronic device with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device; and

connecting the second packaged microelectronic device directly to a second portion of the circuitry of the support member without electrically connecting the second packaged microelectronic device directly to the first packaged microelectronic device.

[c36] 36. The method of claim 35 wherein connecting the second packaged microelectronic device to the circuitry of the support member includes routing connector pins of the second packaged microelectronic device outwardly from an outer edge of the first packaged microelectronic device and attaching the connector pins to the circuitry.

[c37] 37. The method of claim 35, further comprising connecting first connector pins from the first packaged microelectronic device directly to the circuitry of the support member and connecting second connector pins from the second packaged microelectronic device directly to the circuitry of the support member without engaging the first connector pins with the second connector pins.

[c38] 38. The method of claim 35 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the method further includes positioning the second packaged microelectronic device with the third edge located outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge located outwardly beyond the second edge of the first packaged microelectronic device.

[c39] 39. The method of claim 35, further comprising spacing the second packaged microelectronic device apart from the first packaged microelectronic device while the packaged devices are attached to the support member.

[c40] 40. The method of claim 35, further comprising removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member.

[c41] 41. A method for supporting packaged microelectronic devices, comprising:

positioning a first packaged microelectronic device proximate to a support member and electrically connecting the first packaged microelectronic device directly to a first portion of circuitry of the support member;

positioning a second packaged microelectronic device proximate to the first packaged microelectronic device with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device; and

connecting the second packaged microelectronic device directly to a second portion of the circuitry of the support member without fixedly

attaching the second packaged microelectronic device directly to the first packaged microelectronic device.

[c42] 42. The method of claim 41 wherein connecting the second packaged microelectronic device to the circuitry of the support member includes routing connector pins of the second packaged microelectronic device around at least part of the first packaged microelectronic device and attaching the connector pins to the circuitry.

[c43] 43. The method of claim 41 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the method further includes positioning the second packaged microelectronic device with the third edge extending outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge extending outwardly beyond the second edge of the first packaged microelectronic device.

[c44] 44. The method of claim 41, further comprising spacing the second packaged microelectronic device apart from the first packaged microelectronic device while the packaged devices are attached to the support member.

[c45] 45. The method of claim 41, further comprising contacting the second packaged microelectronic device with the first packaged microelectronic device without fixedly attaching the second packaged microelectronic device to the first packaged microelectronic device.

[c46] 46. The method of claim 41, further comprising removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device from the support member.

[c47] 47. The method of claim 41 wherein connecting the second packaged microelectronic device to the support member includes attaching conductive members directly between the second packaged microelectronic device and the support member without connecting the conductive members to the first packaged microelectronic device.

[c48] 48. A method for separating packaged microelectronic devices, comprising:

providing an assembly of packaged microelectronic devices that includes a support member having support member circuitry, a first packaged microelectronic device electrically connected directly to the support member circuitry with first connector members, and a second packaged microelectronic device connected with second connector members directly to the support member circuitry and not the first packaged microelectronic device, the first packaged microelectronic device being positioned between the support member and the second packaged microelectronic device; and

removing the second packaged microelectronic device from the support member without removing the first packaged microelectronic device and without adversely affecting the operability of the first packaged microelectronic device.

[c49] 49. The method of claim 48 wherein the second packaged microelectronic device is one of two second packaged microelectronic devices, and wherein the method further comprises replacing the one second packaged microelectronic device with the other second packaged microelectronic device by electrically coupling the other second packaged microelectronic device to the support member circuitry with the first packaged microelectronic device positioned between the support member and the other second packaged microelectronic device.

[c50]

50. An assembly of packaged microelectronic devices, comprising:
a support member having support member circuitry;
a first packaged microelectronic device connected to at least one of the support member and the support member circuitry and having a first microelectronic die at least partially encased in a first encapsulant to define a first package configuration; and
a second packaged microelectronic device connected to at least one of the support member and the support member circuitry with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device, the second packaged microelectronic device having a second microelectronic die at least partially encased in a second encapsulant to define a second package configuration different than the first package configuration.

[c51]

51. The assembly of claim 50, further comprising a conductive connecting member connected directly between the second packaged microelectronic device and the support member circuitry, at least a portion of the connecting member being positioned adjacent to an outer edge of the first packaged microelectronic device.

[c52]

52. The assembly of claim 50 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the third edge of the second packaged microelectronic device extends outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extends outwardly beyond the second edge of the first packaged microelectronic device.

[c53] 53. The assembly of claim 50 wherein the first packaged microelectronic device has a first planform shape in a plane generally parallel to a plane of the support member and the second packaged microelectronic device has a second planform shape in a plane generally parallel to the plane of the support member, and further wherein the second planform shape is more extensive in at least one direction generally parallel to the plane of the support member than is the first planform shape.

[c54] 54. The assembly of claim 50, wherein the second packaged microelectronic device is spaced apart from the first packaged microelectronic device to define a gap between the packaged devices.

[c55] 55. The assembly of claim 50 wherein the second packaged microelectronic device has a plurality of conductive members electrically coupled to the second microelectronic die and extending away from the second encapsulant, further wherein all the conductive members extending away from the second encapsulant are attached directly between the second packaged microelectronic device and the support member circuitry without being attached to the first packaged microelectronic device.

[c56] 56. The assembly of claim 50, further comprising solder balls connected to the second packaged microelectronic device and the support member, the solder balls being positioned at least proximate to an outer edge of the first packaged microelectronic device.

[c57] 57. An assembly of packaged microelectronic devices, comprising:
a support member;
a first packaged microelectronic device connected to the support member
and having a first microelectronic die at least partially encased in a
first encapsulant to define a first planform shape; and

a second packaged microelectronic device connected to the support member with the first packaged microelectronic device positioned between the support member and the second packaged microelectronic device, the second packaged microelectronic device having a second microelectronic die at least partially encased in a second encapsulant to define a second planform shape different than the first planform shape.

[c58] 58. The assembly of claim 57 wherein the support member defines a support member plane and the first planform shape describes an area in a first plane generally parallel to the support member plane that is smaller than an area described by the second planform shape in a second plane generally parallel to the support member plane.

[c59] 59. The assembly of claim 57, further comprising a conductive connecting member connected directly between the second packaged microelectronic device and the support member circuitry, at least a portion of the connecting member being positioned adjacent to the first packaged microelectronic device.

[c60] 60. The assembly of claim 57 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the third edge of the second packaged microelectronic device extends outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extends outwardly beyond the second edge of the first packaged microelectronic device.

[c61] 61. The assembly of claim 57 wherein the second packaged microelectronic device is spaced apart from the first packaged microelectronic device to define a gap between the packaged devices.

[c62] 62. The assembly of claim 57 wherein the second packaged microelectronic device has a plurality of conductive members electrically coupled to the microelectronic substrate and extending away from the second encapsulant, further wherein all the conductive members extending away from the second encapsulant are attached directly between the second packaged microelectronic device and the support member circuitry.

[c63] 63. An assembly of packaged microelectronic devices, comprising:
a support member;
a first packaged microelectronic device having a first microelectronic die at least partially encased in a first encapsulant and connected to the support member with a plurality of solder balls; and
a second packaged microelectronic device having a second microelectronic die at least partially encased in a second encapsulant and connected to the support member with a plurality of elongated connection members extending from the second packaged microelectronic device around at least part of the first packaged microelectronic device and attached directly to the support member.

[c64] 64. The assembly of claim 63, wherein the first packaged microelectronic device includes a first surface facing toward the support member, a second surface facing away from the support member and toward the second packaged microelectronic device, and a plurality of third surfaces between the first and second surfaces, further wherein the elongated connection members are

positioned adjacent to the third surfaces of the first packaged microelectronic device.

[c65] 65. The assembly of claim 63 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the third edge of the second packaged microelectronic device extends outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extends outwardly beyond the second edge of the first packaged microelectronic device.

[c66] 66. The assembly of claim 63, wherein the second packaged microelectronic device is spaced apart from the first packaged microelectronic device to define a gap between the packaged devices.

[c67] 67. The assembly of claim 63 wherein the support member includes support member circuitry, and further wherein all the elongated connection members of the second microelectronic device are attached directly to the support member circuitry.

[c68] 68. An assembly of packaged microelectronic devices, comprising:
a support member having support member circuitry;
a first packaged microelectronic device electrically coupled directly to the support member circuitry; and
a second packaged microelectronic device electrically coupled directly to the support member circuitry without any direct electrical connections to the first packaged microelectronic device, the first packaged microelectronic device being positioned between the support member and the second packaged microelectronic device.

[c69] 69. The assembly of claim 68, further comprising an elongated conductive connecting member connected between the second packaged microelectronic device and the support member circuitry, at least a portion of the connecting member being positioned adjacent to the first packaged microelectronic device.

[c70] 70. The assembly of claim 68 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the third edge of the second packaged microelectronic device extends outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extends outwardly beyond the second edge of the first packaged microelectronic device.

[c71] 71. The assembly of claim 68, wherein the second packaged microelectronic device is spaced apart from the first packaged microelectronic device to define a gap between the packaged devices.

[c72] 72. The assembly of claim 68 wherein the first packaged microelectronic device is electrically coupled to the second packaged microelectronic device via the support member circuitry.

[c73] 73. An assembly of packaged microelectronic devices, comprising:
a support member having support member circuitry;
a first packaged microelectronic device electrically coupled directly to the support member circuitry; and
a second packaged microelectronic device connected directly to the support member with the first packaged microelectronic device being positioned between the support member and the second packaged

microelectronic device, the second packaged microelectronic device not being fixedly attached to the first packaged microelectronic device.

[c74] 74. The assembly of claim 73 wherein the second packaged microelectronic device is spaced apart from the first packaged microelectronic device to define a gap between the first and second packaged microelectronic devices.

[c75] 75. The assembly of claim 73 wherein the second packaged microelectronic device engages the first packaged microelectronic device.

[c76] 76. The assembly of claim 73 wherein the first packaged microelectronic device has a first edge and a second edge facing opposite the first edge and the second packaged microelectronic device has a third edge and a fourth edge facing opposite the third edge, and wherein the third edge of the second packaged microelectronic device extends outwardly beyond the first edge of the first packaged microelectronic device and the fourth edge of the second packaged microelectronic device extends outwardly beyond the second edge of the first packaged microelectronic device.

[c77] 77. The assembly of claim 73 wherein the second packaged microelectronic device has a plurality of conductive members electrically coupled to the microelectronic substrate and extending away from an encapsulant of the second microelectronic device, further wherein all the conductive members extending away from an encapsulant of the second microelectronic device are attached directly between the second packaged microelectronic device and the support member circuitry.

[c78] 78. An assembly of microelectronic devices, comprising:
a support member having support member circuitry;
a first microelectronic die at least partially encased in an encapsulant,
attached to the support member, and coupled to the support member
circuitry with first conductive members; and
an at least initially unpackaged second microelectronic die positioned at
least proximate to the encapsulant of the first microelectronic die
and coupled directly to the support member circuitry with second
conductive members that are not connected to the first conductive
members, with one of the first and second microelectronic dies being
positioned between the support member and the other of the first
and second microelectronic dies.

[c79] 79. The assembly of claim 78 wherein the encapsulant is a first
encapsulant, and wherein the assembly further comprises a second encapsulant
disposed adjacent to the second microelectronic die after the second
microelectronic die is coupled to the circuitry of the support member.

[c80] 80. The assembly of claim 78 wherein the second microelectronic die
engages the encapsulant of the first microelectronic die.

[c81] 81. The assembly of claim 78 wherein the second microelectronic die is
spaced apart from the encapsulant of the first microelectronic die.

[c82] 82. The assembly of claim 78 wherein the first microelectronic die and
the encapsulant are positioned between the support member and the second
microelectronic die.

[c83]

83. The assembly of claim 78 wherein the first conductive members include solder balls and the second conductive members include elongated conductive pins.